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Project Leader's Report

October 2004

USDA Forest Service - Southern Research Station - 320 Green Street Athens GA 30602 - http://www.srs.fs.fed.us/disturbance

DIVISE
DISTURBANCE AND MANAGEMENT OF SOUTHERN ECOSYSTEMS

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Outreach Activities:

Seven organized groups, totaling 105 people visited the Brender Forest during October. These groups included Boy Scout Troop 170 from Macon, three Mercer University ecology classes, the First Baptist Church Royal Ambassadors from Gray, the Central Georgia Hikers, and a Forester and Logger's Education Workshop. There was a special deer hunt on the forest for wheelchair-bound hunters, along with the first regular deer hunt of the season.

Approximately 40 visitors came by the office at the Brender Forest for information and 66 people signed the register at the Hitchiti Interpretive Trail.

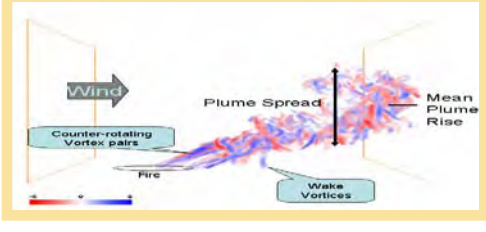
Wheelchair hunters

Group at the Forester and Logger's Education Workshop examining BMP practices for logging roads

Technology Transfer:

• John Stanturf and Rick Reitz attended the Society of American Foresters' Annual Meeting in Edmonton, Alberta. They conducted two focus group sessions with selected attendees to test a survey for the SAF to use in a study of how professional foresters acquire technical knowledge. The survey will be conducted using the internet.

• Rick Reitz presented a paper on Firewise communities at the SAF meeting in Edmonton, Alberta.



• Scott Goodrick and Dave Cleland presented papers at the "Advancing the Fundamental Sciences" meeting in San Diego. Scott's paper on "Numerical Modeling of Vortices on Wildland Fires and Their Potential Impact on Fire behavior and Smoke Dispersion" was co-authored by Phil Cunningham, Florida State University Department of Meteorology. Dave's paper, "Sections and Subsections of the United States: Mapping and Applications," was co-authored by James E. Keys, Washington Office.

• Yong Liu attended the 2004 CMAQ Workshop, held at the University of North Carolina at Chapel Hill. Yong presented a paper "Air Quality Effects of Florida Prescribed Fires Simulated with CMAQ" by Liu, Achtemeier, and Goodrick. The agenda included discussions of CMAQ evaluation, model development, climate and pollution feedbacks, air quality forecast, air quality management, and computation.

• Tom Waldrop was a guest lecturer for The Nature Conservancy's Fire Management Training Course, RX-310, Fire Effects. The week-long class was held in Black Mountain, NC, with 54 students representing federal and state agencies and private organizations from several southern states. Tom discussed alternative fire prescriptions and their impacts for restoring communities of Table Mountain pine and pitch pine. He provided a field tour of the Southern Appalachian site of the National Fire and Fire Surrogate Study at the Green River Game Land and presented early results on fuels, vegetation, wildlife, fire behavior, entomology, and pathology. He also discussed future plans for multi-site and multi-discipline analyses.

• Scott Goodrick and John Stanturf will attend the Drought 2003 meeting in Freiburg, Germany next month. Scott will present a paper "Spatial modeling of drought using artificial neural networks" (co-authored by Yong Liu and John Stanturf). John will present a poster "Modeling ecosystem water stress and fire risk under drought conditions" (authored by Liu,

Stanturf, and Goodrick) and moderate a session on Pests, Diseases, Fire, and Ozone. John was a member of the Scientific Advisory Committee for the meeting.

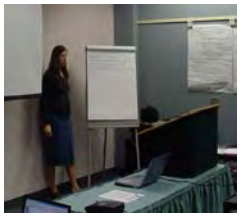
• Ralph DiCosty will present a poster at the Soil Science Society of America annual meeting in Seattle, entitled "Fifty years of prescribed burning: effects on soil organic matter composition and podzolization in a Spodosol soil profile in the Southeastern United States" (authored by DiCosty and Stanturf).

• John Stanturf will present a poster "Three-year growth response of four clones of eastern cottonwood (*Populus deltoides* Bartr. ex Marsh.) to fertigation" (authored by Stanturf, Bland, Samuelson, Leininger, and Burke) and report on short-rotation woody crops activity in the South at the Short Rotation Woody Crops Operations Working Group Biennial Meeting in Charleston. He was on the planning committee and will be guest co-editor, with Mark Coleman, of a special issue of Biomass and Bioenergy with selected papers from the meeting.

Meetings/Reports:

• John Stanturf represented the unit at the Forest Service Research and Development Global Change All Scientists Meeting, held at Welches, Oregon, where he facilitated a breakout session on research on climate change and ecosystems. Attendees were charged with identifying priority research in different areas that tie to the US Climate Change Science Program (CCSP) strategic plan, and identifying regional and national climate change issues that should be addressed in the next Resources Planning Act (RPA) report. Additional next steps identified were a probable Request For Proposals seeking synthesis products or workshops that will come out in January to February timeframe through the stations; a General Technical Report of work in progress, similar to one done in 1995; and regional case studies of Climate Change work recently completed or nearing completion that could be highlighted. Three suggestions from the South involve unit staff.

• Stanturf attended the SRS Management Team meeting held at the Coweeta Hydrologic Lab near Franklin, NC. Stanturf and Phil Araman reported on the knowledge acquisition research they have underway. There was much discussion of organizational changes and performance accountability. A thumbnail sketch of the organizational changes includes: Information Services Organization (ISO) takes over computers in February 2005; Budget and Fiscal folks begin moving to Albuquerque Service Center (ASC) starting in January 2005; phasing of Human Resources changes over next three years, with 2005 devoted to getting electronic technology to enable shifting the burden of work to individual employees. Although a transition team of HR folks will be in place at the ASC by January, most people will stay in place until June 2006 when moves will begin with Classification, Pay, Staffing, and Benefits. Grants and Agreements staff will remain in Asheville.



• Cynthia Fowler and Deborah Kennard hosted the first meeting of the Southern Fire Portal at the Warnell School of Forest Resources, University of Georgia in Athens. The Southern Fire Portal is a new project sponsored by the Joint Fire Science Program to develop a one-stop electronic portal for fire information. Members of the Southern Fire Portal Team who attended the meeting were from the University of Idaho (Greg Gollberg, Merrick Richmond), US Geological Survey (Jennifer Pollock, Lisa Zolly, Ray Carlino, Shelaine Curd-Hetrick), US Forest Service PNW (Dianna Olsen), Tall Timbers Research Station (Ron Masters, Ann Bruce, Kathy Marois), The Nature Conservancy (Kevin Hiers), US Fish and Wildlife Service (Dave Brownlie), the Cooperative Extension Service (Bill Hubbard), and the Joint Fire Science Program (Tom Wordell) in addition to Fowler, Kennard, and Reitz.

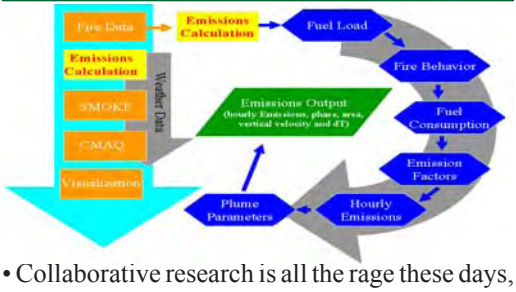
• Richard Reitz and Cynthia Fowler hosted a 3-day workshop for people in USDA and USDI interested in science and technology application (S&TA). The objectives of the workshop were to build a network of people working in S&TA to resolve organizational issues and to become aware of many agency S&TA efforts. Presentations and discussion included current S&TA activities and thoughts for the future, science in management and policy, overcoming NEPA issues in planning National Fire Plan activities, S&TA coming through service centers, logic modeling, becoming a learning organization, social influences to the adoption of science, and sharing experiences in S&TA work.

Partnerships:

• Gary Achtemeier will partner with Richard Dunk (left), Director of the Coastal Laboratory for Applied Meteorology Institute of Marine and Coastal Sciences at Rutgers University, to use their mobile Doppler sodar to measure large eddy turbulence beneath smoke plumes, and to the side where circulations would be unimpeded by the presence of smoke. They will test the hypothesis that smoke plumes from large prescribed fires sweep up large eddy turbulence, leaving a wake area for some distance downwind with weak vertical circulations. Regeneration of large eddy turbulence farther downwind may transport smoke en masse back to the ground, creating local visibility problems. The Doppler sodar will be used on prescribed burns in February. Sodar (*SOnic Detection and RAnging*) systems are used to remotely measure the vertical turbulence structure and the wind profile of the lower layer of the atmosphere. Sodar systems are like radar (*RAdio Detection and RAnging*) systems except that sound waves, rather than radio waves are used for detection.

• The Smoke Management Team will collaborate with EPA Region 4 in a model inter-comparison study between the EPA smoke plume model CalPuff and the SMT model, Daysmoke. The groups will share weather data. The EPA team will run CalPuff and the SMT team will run Daysmoke.

Science Highlight:



• Collaborative research is all the rage these days, although most organizations have difficulty forcing partnerships. Successful collaboration resembles an organic process, with interaction back and forth between researchers as the discussion widens to bring other colleagues into the collaboration. Recent developments surrounding Daysmoke, a model developed by Gary Achtemeier, illustrate this process. The Smoke Management Team (SMT—Achtemeier, Scott Goodrick, Yongqiang Liu, Ken Forbus, and Tim Giddens) worked feverishly over the summer to link Daysmoke with CMAQ, the regional air quality model used by EPA. Daysmoke models smoke plume transport, replacing older models such as VSmoke. As reported in last month's Project Leader's Report, Gary developed a "representative" vertical smoke profile for Greg Stella, a modeling contractor for VISTAS, to





Achtemeier *Goodrick* *Liu* *Forbus* *Giddens*

use in testing CMAQ. The profile was based on sounding data provided for Florida by Yong Liu and transformed to the coordinate system used in Stella's modeling protocol. The air quality community's interest in this work was sparked by presentations made by Achtemeier, Liu, and Goodrick at various meetings, and Gary recently participated in a conference call with representatives from FS, WRAP, VISTAS, and EPA. The call, moderated by Pete Laham of the WO, was mostly devoted to discussing the smoke plume test case and how the SMT is proceeding in linking Daysmoke with CMAQ. The SMT met with representatives from EPA this month to set up collaboration for a model inter-comparison study between the EPA smoke plume model CalPuff and the SMT model, Daysmoke. The groups will share weather data. The EPA team will run CalPuff and the SMT team will run Daysmoke. Following initial contacts at the FCAMMS meeting in August, Gary offered to partner with Shawn Urbanski of the National Center Atmospheric Research (NCAR) to use Daysmoke in WRF/CHEM, another regional air quality model. Urbanski is interested in testing Daysmoke as a plume rise model for input to WRF/CHEM. Urbanski is working on a test case of the 2002 Hayman fire in Colorado. Initially, he will use his own fire emissions. Scott Goodrick has successfully matched Daysmoke with an emissions production model, which means better simulation of hourly emissions and the resulting vertical distribution. Scott may apply his fire emissions-Daysmoke approach to the Hayman fire, and compare the modeled emission approach used by Scott to the current empirical approach used by NCAR. The payoff in the end will be air quality planning and regulations based on realistic emissions from wildland fire. Some lessons for research management are that essential elements of collaborative research are addressing pressing questions of more than academic interest, good ideas, approaches, and sound science, and supporting opportunities for scientists to gather and interact.

Funding:

• Mac Callaham received second year funding from the Department of Energy for his work at Oak Ridge National Lab on "Microbiotic facilitated vertical transport of soil carbon" in the amount of $30,000 (Agreement 03-IA-11330136-083).

From the Cover (Masthead) - Soils of Southern Pine Forests.


Cecil Soil


Bama Soil


Leon Soil


Myakka Soil


Madison Soil

Visitors:

• Bruce Bayle and Tom Darden, Region 8, visited John Stanturf to discuss unit research and received a brief update from the Smoke Management Team on their work.

• Tom Dzomba and Rick Gillam from EPA HQ Region 4 Atlanta visited with the Smoke Management Team to discuss a model inter-comparison study between the EPA smoke plume model CalPuff and the SMT model, Daysmoke.

• John Blake of Savannah River Forest Institute visited Gary Achtemeier to arrange an update on the research funded by Savannah River from Gary and Luke Naeher, UGA cooperator. The update will be given at the meeting of the Savannah River management team on January 26-27, 2005 in Athens.

Personnel News:

• Welcome to Belle Chapman, new daughter of Gregg and Lynne Chapman!

• John Stanturf received the Golden Passport Award from Director Pete Roussopoulos at the recent Management Team meeting at Coweeta. The award was for "international travel in search of a meeting where something of consequence happened." It's an inside joke.


Janet is sending John on a quest for a meeting where something of consequence has happened.

News from Around the Region:

• Personnel changes in Washington Office include Hao Tran, formerly Assistant to the Deputy Chief, to Pacific Southwest Station as Assistant Director; retirement announced of Associate Deputy Chief Barbara Weber; Greg Reams, Forest Health Monitoring Project Leader in Raleigh to Inventory and Monitoring staffer in WO.

• In the Southern Research Station, Mike Rauscher, scientist at Bent Creek, will move to Communications staff in Asheville to head up the SRS efforts in hypertext delivery systems development. A major refocusing of the Communications staff was presented at the Management Team meeting, signaling a shift away from a focus on printed publications. The marketing specialist will be replaced by a science delivery specialist; office automation clerk by a computer specialist to assist the webmaster; and a media/legislative affairs specialist hired.

• An Early Warning Center (detection and rapid response to insects and pathogens) for forest health has been established in Prineville, Oregon. An eastern center is being discussed, possibly located in or near Asheville, NC. Other units "in play" include the National Agroforestry Center in Lincoln, Nebraska, and the National Seed Laboratory in Macon, Georgia.

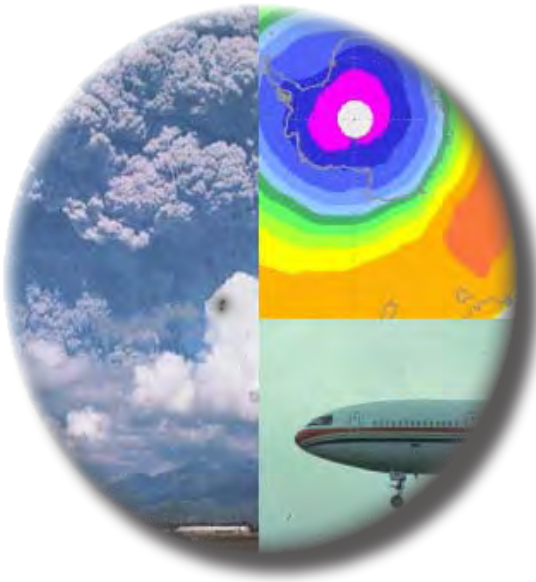
College of Forest Resources
Forest and Wildlife Research Center
Department of Forestry

• Jim Shepard has accepted the position of Chair, Department of Forestry at Mississippi State University. A native of Yazoo City, MS, Jim is currently Sustainable Forestry Program Manager for NCASI (National Council for Air and Stream Improvement). He should be in place in Starkville in January.

• FORREX, the Forest Research and Extension Partnership in British Columbia, has a new Series available on-line, "Historical Variability of Natural Disturbances in British Columbia: A Literature Review." Authors Wong, Sandmann, and Dorner summarize information about important disturbance agents - such as wildfires, windthrow, or insect and disease outbreaks - by biogeoclimatic zone, and by subzone and variant where applicable. They focus on characterizing disturbance frequency and patch size. Their review provides a starting point for people interested in: 1) designing strategic and operational plans based on natural disturbance patterns in a specific area, 2) revising and

refining natural disturbance type classification, and 3) identifying areas for future research. Internal hyperlinks allow for easy navigation between in-text references and an extensive table summarizing cited authors' findings. Read this FORREX Series at: http://www.forrex.org/publications/FORREXSeries/FS12.pdf

• A study recently published by the Royal Swedish Academy of Agriculture and Forestry (KSLA), "Climate change and forestry in Sweden: A literature review" identified major knowledge gaps and obstacles to improving our understanding of climate change on forestry. The findings are summarized from the report, which can be downloaded from http://www.ksla.se/sv/retrieve_file.asp?n=361. The scope of the study was to review the relevant literature regarding the impact of climate change on forestry in Sweden, to synthesize current knowledge, to draw conclusions on likely effects of climate change and to identify areas in which further research and knowledge are required. They limited the study to the effects over short and medium time spans (20–100 years), focusing on direct climatic effects on the trees, and indirect effects mediated by the climatic impact on soils, herbivores, insects, pests and diseases. This literature review has revealed major deficiencies in our knowledge about the effects that expected climate change will have on the forest ecosystems. For instance, the potential effects of climatic changes on the structure and processes of forest ecosystems are even less certain than the likely nature and magnitude of the climatic changes per se. However, the most likely effects of climate change can be predicted. They generally include an increase in potential biomass production, possibilities to grow new species commercially and increased risk of several kinds of damage. Climate change appears to offer new opportunities to forestry, while increasing the risk of calamities. This calls for radical approaches to both forest and risk management. The reviewed literature contains indications that a better understanding of the links between climate, the forest and forestry is required. However, the study also identified three major obstacles that need to be overcome in order to improve our understanding of the issues, risks and possibilities associated with the potential impact of continued climate change on forests and forestry: (1) Studies undertaken so far have generally addressed some specific aspect of the overall forestry/forest system, instead of adopting a more integrated approach in which the system as a whole and various feedback mechanisms are considered. (2) Published studies differ in their choices of climate change scenarios. Thus, the findings refer to different shifts in temperatures, precipitation and other climate variables, making it difficult to collate and integrate the findings. (3) The transience of the anticipated climate changes have not been included in the studies, as they typically refer to impacts under a specific, static, new climatic regime. However, instead of switching instantaneously to a new climatic regime sometime in the future, the forest and forestry will probably face continuous, ongoing changes in climate, implying that conditions will constantly change within a typical tree crop rotation and from one rotation to the next.



• Russia's lower house of parliament ratified the Kyoto Protocol this month, clearing the way for the long-delayed climate change pact to come into force worldwide. The U.N. accord aimed at battling global warming is already backed by 126 countries, but it needed Russia's support to make it internationally binding after the United States pulled out in 2001. The 1997 Kyoto Protocol obliges rich nations to cut overall emissions of heat-trapping carbon dioxide by 5.2% below 1990 levels by 2008-12 by curbing use of coal, oil and natural gas and shifting to cleaner energies such as solar or wind power. To come into force, the pact needed to be ratified by countries accounting for at least 55% of developed nations' greenhouse gas emissions. Russia, which accounts for 17 percent, became the key to Kyoto after the U.S. pull out. Russia's Duma passed the Kyoto bill by 334 votes in favor, with 73 against and two abstentions. The upper house must still consider Kyoto, and then President Vladimir Putin will have up to two weeks to sign it. These steps are seen as formalities after the vote in the Duma, which is controlled by pro-Kremlin parties. Although saved with Russian help, the Kyoto pact on global warming offers too little to arrest climate change and governments should adopt more radical solutions, the top U.N. climate expert said. Rajendra Pachauri, chairman of the United Nations' Intergovernmental Panel on Climate Change (IPCC), urged the world to shift strategy from Kyoto's reduction targets for greenhouse gases to long-term global targets on how much of the gases the atmosphere should contain. (Source: Reuters)

Publications

FY 2005 Publications: (* denotes new publication this month)

Refereed Journals and Book Chapters

Stanturf, J.A., Conner, W.H., Gardiner, E.S., Schweitzer, C.J., and Ezell, A.W. 2004. Recognizing and overcoming difficult site conditions for afforestation of bottomland hardwoods. *Ecological Restoration* 22(3): 183-193. (Counted in last year)

Proceedings and Reports

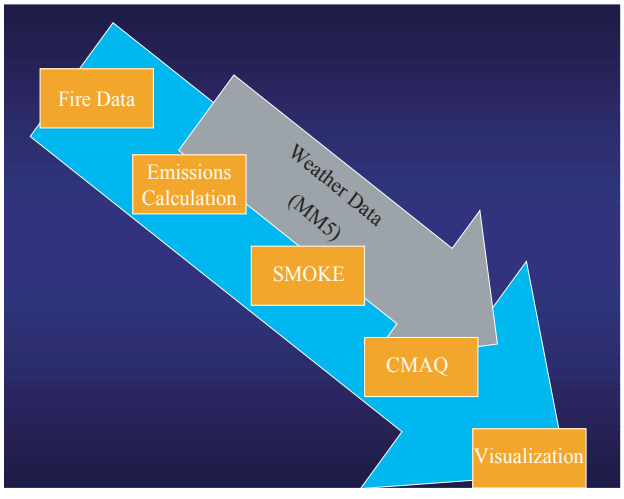
Myers, R., Wade, D., and Bergh, C. 2004. Fire management assessment of the Caribbean pine (*Pinus caribea*) forest ecosystems on Andros and Abaco Islands, Bahamas. GFI Publication no. 2004-1. The Nature Conservancy, Arlington, VA. 18 pp.

Reitz, Richard D. and Geissler, George L. 2003. Community advisor—Firewise. In Proc. Society of American Foresters National Convention, 25-29 October 2003, Buffalo, NY. P. 63-72.

Abstracts and Posters

DiCosty, R., Kelley, S., Rials, T., Stanturf, J.A. 2004. Soil black carbon levels and soil organic matter quality under interval prescribed burning in the southeastern United States. Eurosoil 2004, 4-12 September, Freiburg, Germany [Poster]

*Liu, Y., G. Achtemeier, and S. Goodrick. 2004. Air quality effects of prescribed fires simulated with CMAQ. The Third Models-3 Workshop, Chapel Hill, NC, 18-20 Oct 2004. (Extended abstract, paper 6.5, pp 1-4, available from http://www.cmascenter.org/html/2004_workshop/abstracts_presentations.html.



An overview of the SHRMC-4S framework

Upcoming Events:

Upcoming Events:

2004

Oct 31-Nov 3	Soil Science Society of America Annual Meeting, Seattle, WA; DiCosty to attend
Nov 6-8	Southeastern Society American Foresters Annual Meeting, Jacksonville, FL "Managing forests for wildlife"
Nov 8-10	Centennial Forum on Forest Management and Research. Callaham to attend.
Nov 8-12	Short Rotation Woody Crops Operations Working Group Biennial Meeting, Charleston, SC; selected papers to be published as a special issue of Biomass and Bioenergy; Stanturf to attend and present http://www.woodycrops.org/meeting_2004_second_call.pdf
Nov 17-25	IUCN Third World Conservation Congress (WCC), Bangkok.
Nov 17-19	Assessment of the 2003 drought and heat impacts on forests, international conference sponsored by University of Freiburg, European Forestry Institute, Baden-Würtemburg Forestry, FVA; Freiburg im Breisgau, Germany; Stanturf and Goodrick to attend and present http://www.forst.uni-freiburg.de/Waldwachstum/Drought2003_Nov2004.htm
Nov 17-19	Mixed severity fire regimes: Ecology and management conference, Spo kane, WA; http://www.emmps.wsu.edu/fire/ .
*Nov 18-19	Fire Science in Forestry Management Workshop, Charleston, SC; contact Lindsay White, 843-870-3370; Outcalt to attend
Nov 24-26	Introduction of broadleaf species for sustainable forest management, international conference sponsored by SUSTMAN project at the Univer sity of Ulm; to be held in Reisensburg, Germany, http://www.sustman.de/Symposium.htm
Nov 28-Dec 2	International Poplar Commission Session 22, Santiago, Chile; Stanturf to attend and present http://www.fao.org/forestry/foris/webview/forestry2/index.jsp?geoId=0&langId=1&siteId=1580
Dec 8-10	Bioenergy and Biobased Products from Sustainable Forest Management in the Southern United States Conference; Houston, Texas http://forestbioenergy.tamu.edu/brochure_detailed/brochure02.html
Dec 13-17	Fall 2004 American Geophysical Union (AGU) Meeting In San Francisco, CA Ecosystems In Flux: Molecular And Stable Isotope Assessments Of Soil Organic Matter Storage And Dynamics http://www.agu.org/meetings/fm04/search_detail.php?sessid=274
Dec 16-17	SOFOR GIS 2004, Athens, GA; http://www.gactr.uga.edu/conferences/forestry/index.html

2005

Jan 30-Feb 4	9th International Symposium on Soil and Plant Analysis, Cancun, Mexico http://www.spcouncil.com/ISSPA%20Page/Cancun20033.pdf.
Feb 28-Mar 4	13th Biennial Southern Silvicultural Research Conference, Memphis http://www.srs.fs.usda.gov/oaks/osc
Mar 13-16	Emerging Issues Along Urban/Rural Interfaces: Linking Science and Society; Atlanta, IUFRO 6.00; http://www.sfws.auburn.edu/urbanruralinterfaces/
Mar 21-24	USDA Symposium Greenhouse Gases In Agriculture and Forestry: Refining Knowledge and Building Tools, Baltimore, MD; http://soilcarboncenter.k-state.edu/conference
Mar 29-Apr 6	Global Soil Change: Time-Scales and Rates of Pedogenic Processes, Montecillo, Mexico. http://www.iuss.org/popup/Mexico%202005.htm
Apr 25-27	Biennial Georgia Water Resources Conference, Athens; http://ga.water.usgs.gov/gwrc/callforpapers.html

Upcoming Events:

May 11-13	Conference on Remote Sensing and Fire, to be held at George Mason University in Fairfax, VA.
Jun 20-24	5th International Conference on Forest Vegetation Management, IUFRO Research Group 1.13.00 Forest Vegetation Management. Corvallis, Oregon, USA. **Abstracts for selection submitted on-line by November 30, 2004**. http://outreach.cof.orst.edu/icfvm/index.htm
Jun 6-10	National Silviculture Workshop, "Restoring fire-adapted forested ecosys tems" Granlibakken Conference Center in Tahoe City, California
Jul 18-22	AFFORNORD, Conference on Effects of Afforestation on Ecosystems, Landscape & Rural Development, Reykholt, Iceland; http://www.skogur.is
Aug 8-13	IUFRO World Congress, Brisbane, Australia. Stanturf to attend. http://www.iufro2005.com
Sep 9-10	Pre-Conference Workshop in association with Pedometrics 2005 Confer ence, Gainesville, FL. http://conference.ifas.ufl.edu/pedometrics/#optional
Sep 10-12	European Forestry Institute annual conference and Scientific Seminar "Multifunctional Forest Ecosystem Management in Europe: Integrated ap proaches for considering the temporal, spatial and scientific dimensions" Centre Tecnològic Forestal de Catalunya (CTFC), Barcelona, Spain
Sep 12-14	Pedometrics 2005: Frontiers in Pedometrics, Naples, FL. http://confer ence.ifas.ufl.edu/pedometrics/
Sep 12-18	Society for Ecological Restoration 17th International Conference, Zaragoza, Spain. http://www.ser.org/events.asp?EventID=9
*Oct 17-19	23rd Tall Timbers Fire Ecology Conference "Fire In Grassland and Shru bland Ecosystems", Bartlesville, OK; http://www.talltimbers.org
Oct 19-23	Society American Foresters Annual Meeting, Ft. Worth, TX
Nov 6-10	Soil Science Society of American Annual Meeting, Salt Lake City, UT
*Nov 15-17	Fire in Eastern Oak Forests: Delivering Science to Land Managers; Columbus, OH; Contact Matt Dickinson, mbdickinson@fs.fed.us
2006	
Jul 9-15	18th World Congress of Soil Science, in Philadelphia, PA http:// www.18wcss.org
Oct 25-29	Society American Foresters Annual Meeting, Pittsburgh, PA

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GPRA -Accomplishment

Category	FY 2004 Total	FY 2005 Total
Number of Refereed Journal Publications	20	
Number of Non-Refereed Publications (include abstracts)	89	4
Number of Publications (refereed + non-refereed)	109	4
Number of Tours	41	7
Number of Short Courses/Training	20	3
Number of Invited Presentations to Scientific Organizations	12	1
Number of Invited Presentation to Lay Organizations	30	4
Volunteer Presentations to Scientific Organizations (non-GPRA	42	7
Number of Technology Transfer Activities (other than above)	105	17
Outside Funding	$2,610,574	$628,307

SRS-4104 Project Leader's Report

John Stanturf - Editor Lynne Breland - Technical Writer Patricia A. Outcalt - Production, Design and Layout

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